Names: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Hour: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Water Treatment Project**

**History of Water Treatment**

Water has always played a prominent role in human civilization. When people first began settling in one place and growing crops for sustenance, it was invariably near water sources like rivers, lakes, or groundwater springs. Water was needed for drinking, preparing food, bathing, cleaning, irrigating crops, and a variety of other tasks, so it was important to have ready access to this resource. The water sources used for supplying water were not always clean however, and treating drinking water to improve smell, taste, clarity, or to remove disease-causing pathogens has occurred in one form or another throughout recorded history. Begin by reviewing the history of drinking water treatment with the document below from the U.S. EPA.

In this project we’ll be treating "contaminated" water to observe firsthand the steps involved in purifying water for human consumption. The project will use everyday items to carry out the steps in drinking water treatment and you will record changes in the water’s properties as the process progresses. You must record the appearance and odor of untreated water as it moves through the various steps. You will have to test each substance and each step to determine how you want to filter the water and the process it goes through. You may need to refer to past assignments, discussions, notes, or activities to help you.

**[WARNING]:** The water used in the experiment is not suitable for drinking at any stage in treatment. Hence, do not consume the water under any circumstances.

**Project Outline and Observations**

Use the equipment at your station to treat a water sample. You will need to test different types of treatments, design a filter, and treat your sample. You will need to decide what needs to be done, the order it should be done in, and what should be used. Once you have determined how you will treat your water, treat the contaminated sample and collect your data. You should filter at least 1.5 liters of the contaminated water and take at least three observations during the treatment.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sample | Appearance | Odor | Turbidity | Other |
| Contaminated Water |  |  |  |  |
| First Treatment Sample |  |  |  |  |
| Second Treatment Sample |  |  |  |  |
| Third Treatment Sample |  |  |  |  |

***Contaminated Water***

Agitate (mix up) the container of contaminated water. Describe the appearance and odor and turbidity of the water. Obtain a 1.5 liter sample of the water to treat.

**Possible Treatment Steps**

***Aeration***

Cap the two liter bottle and aerate the water by shaking it vigorously for 30 seconds. Pour the water into one of the cut-off two liter bottles, and then pour the water back and forth between the cut-off two-liter bottles five times. Once you are done, describe the appearance and odor and turbidity of the water.

***Coagulation***

The water should be in one of the cut-off two-liter bottles. Add 20 grams of alum crystals to the container and stir gently for 5 minutes. The alum will act as a coagulant and bind with the particles suspended in the water. Describe what happens to the appearance of the water during the 5 minutes.

***Sedimentation***

Leave the container undisturbed for 20 minutes, and record observations of the water's appearance and turbidity at 5 minute intervals.

***Filtration***

Construct a filter to filter the contaminated water. Decide what to put in it and how to put it in. Test each substance and then decide what to use. Just remember, DO NOT disturb the sediment when pouring! Allow the water to settle and percolate through the substances and collect in the beaker below. Possible substances to use include rocks, soil, activated charcoal, sand, and filter paper. Make observations of the appearance, odor, and turbidity through each substance to help determine if you want to use it and the order you want to place them in your filter.

**Analysis**

1. Summarize the steps you took to treat your water. Be sure to describe the order of steps you took, what you did in each step, and why you did that step.
2. One of your steps should have been to filter the water. Draw a simple diagram of the filter system you decided to use. Label all the pieces used in your filter. Describe why you used the substances you did and why you put them in the order you did.
3. Do you think your treatment system could desalinate seawater? Why or why not?
4. During this water treatment activity, what water quality issues are we ignoring? How do you think we could adjust our treatment to address these?
5. Could this contaminated water sample be made safe for human consumption? Why or why not?